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*"Migrant" Workers in Israeli Agriculture
and Export Expansion: Is there a Link?*

Ayal Kimhi
The Hebrew University
Taub Center for Social Policy Studies in Israel
The Center for Agricultural Economic Service

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by

Ayal Kimhi

Department of Agricultural Economics and Management, The Hebrew University

Taub Center for Social Policy Studies in Israel

The Center for Agricultural Economic Research

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Historical background

Jewish agricultural settlement in Israel started in the late 19th century with the support of Baron Edmond James de Rothschild, who bought land and invested in infrastructure, farm equipment and agricultural research. Based mostly on horticulture (citrus, grapes), family farms relied on Palestinian hired labor which was abundant and cheap. In the early 20th century, young socialist immigrants tried to compete with the Palestinians for the agricultural work, with little success. Consequently, these immigrants later established their own agricultural settlements: first the *Kibbutz*, a collective commune with joint production and consumption, and later the *Moshav*, a cooperative village of individual family farms (Kislev, 1992). Both Kibbutz and Moshav were based on Zionist and socialist ideology, and one of the main principles was self-employment. As a result, farms were planned to rely on family labor alone.

After the establishment of the State of Israel in 1948 and the subsequent mass migration of holocaust refugees and refugees from hostile Arab countries, the self-employment principle was relaxed because of the need to increase food production on one hand and provide employment for the new immigrants on the other hand. Following the 1967 war, Palestinian workers from the West Bank and Gaza Strip became available for employment at low wages, and they gradually replaced some of the unskilled Israeli hired laborers, commuting daily from their residence. During the first Palestinian Intifada (uprising) and the first gulf war, Palestinian laborers became a security burden, and many of whom could not come to work on a regular basis due to frequent blockades (Angrist, 1996). Beginning in 1993, the government allowed farmers to bring a small number of guest workers from Thailand to replace the Palestinians, and the number of permits was increased in subsequent years as the security situation deteriorated (Miaari and Sauer, 2011). Between 1996 and 2000, the number of permits for guest workers in agriculture was roughly 17,000, and since 2002 it has been around 27,000.

Regulation

Initially, Palestinians could work in Israel almost freely, after registering with the Israeli Employment Service, with the only constraint being that they must return to their homes every day. Following the first Intifada, and especially since the second Intifada, Palestinians need a personal permit in order to work in Israel. These permits are issued by the Ministry of Defense and their number is determined according to the security situation, although an increase in the number of permits is in most cases a political decision. A permit-holding Palestinian can commute to Israel daily in order to work without further regulation on the sector, location or terms of work.

Guest workers are brought from Thailand for a period of 5 years according to permits given to employers. Hence, each worker is assigned to a specific employer.¹ The number of permits is determined by the government, and they are issued by the Ministry of the Interior, according to the recommendations of the Ministry of Agriculture. The recommendations are based on specific criteria that are updated from time to time. Specifically, farmers have to apply for permits and report the type and size of their operations. The Ministry decides how many workers are needed per unit of operation in each enterprise, and then adjusts the numbers downwards to fit the number of permits which is always lower than the demand. Once the farmer obtains the permits, he approaches one of a number of certified employment agencies in order to find the workers and bring them to Israel. The agency is supposed to make sure that the workers are paid the official wage rate and obtain decent living and working conditions. The government charges a fee for each permit issued, which must be paid by the farmer. While farmers claim that the total cost of a guest worker is not lower than that of a comparable Israeli worker, it is reasonable to assume that it is considerably lower in terms of efficiency units.

Foreign workers in Israel

Palestinian workers were employed not only in agriculture. Their role in the construction sector was even larger (Bartram, 1998). Hence, at the same time that the government allowed bringing Thai workers to agriculture, it also allowed bringing foreign construction workers, initially from Romania and Portugal and subsequently from China. These workers were brought on terms similar to those of the Thai workers, but while the agricultural workers tended to comply with the regulations, many of the construction workers left their designated employers and went to work illegally (Amir, 2002; Ida, 2012). Foreign workers were also allowed to be brought for geriatric care work, mostly from the Philippines and more recently also from Nepal and India. Altogether, it was estimated that at the end of 2009 there were about 130 thousand legal foreign workers in Israel and a similar number of illegal workers, comprising more than 10 percent of workers in the private sector. In addition, in recent years, especially during 2007-2011, there was an inflow of asylum and employment seekers from Africa, crossing the border from Egypt. Their number was

¹ Seasonal mobilization of workers between employers is allowed in recent years under certain conditions.

estimated at 20 thousand at the end of 2009, 33 thousand at the end of 2010, and 50 thousand at the end of 2011. During the second half of 2012 the number of new illegal immigrants declined sharply as a result of more intense border control activity and physical entry barriers. As of July 2013 the number of asylum and employment seekers was 54 thousand, and their inflow stopped completely.

Theoretically, immigration is considered a growth engine. On the other hand, immigrants compete for jobs held by the local labor force. In the case of Israel, foreign workers replace unskilled workers who have trouble finding other jobs. These workers join the pool of non-employed and are less likely to escape poverty. This is the main motivation for the government to try to reduce the number of foreign workers. A number of governmental committees had attempted to set targets for reducing the number of permits of foreign workers and deporting illegal workers, but most of these efforts failed either because of pressures exercised by employer organizations or because of lack of determination of the enforcement authorities.

The Eckstein Committees

A committee headed by Tel Aviv University Economics Professor Zvi Eckstein, at the time serving as Deputy Director of the Bank of Israel, recommended in 2007 to reduce the number of foreign workers in agriculture to 5,000 by 2014, all of whom to be employed in the far south. Another committee headed by Eckstein negotiated a deal with farmers' representatives in 2009 to gradually reduce the number of foreign workers in agriculture by about a third, to 18,900, by 2015. The reduction in the number of employment permits was conditional upon the implementation and success of accompanying policies to subsidize farmers' investments in labor-saving technologies and invest in developing new labor-saving technologies, to subsidize the employment of Israeli workers, and to create a system of bringing seasonal foreign workers. Until now, little success has been recorded. Adopting labor-saving technologies is slow due to farmers' reluctance to give up on their "right" to employ foreign workers in exchange for machines that substitute for them only partially. Employment of Israeli workers did not increase, in part because farmers had negative experience with similar attempts in the past, and in part because the wage subsidy was not attractive enough. A plan for bringing seasonal foreign workers from Sri Lanka was designed and passed the pilot stage with some success, and is awaiting full implementation. The bottom line is that the number of foreign workers in agriculture remained roughly stable over the last decade.

Changes in agriculture

After Israel declared its independence and masses of immigrants started pouring in, food security became one of the government's top priorities. Many agricultural communities (especially *Moshav* villages) were established in the early 1950s and populated by immigrants. The new settlers were provided with infrastructure and professional guidance

to allow them to make a living off agriculture. Agricultural research was also promoted and financed by the government, and the resulting technological progress was remarkable. In the 1970s, terms of trade in agriculture were already worsening, but the prosperity of agriculture continued thanks to the opening of export markets for fruits, vegetables and flowers. This led to increased capital investments that were subsidized heavily by the government. However, the reliance on exports made farmers more vulnerable to world price fluctuations and macroeconomic conditions. The unstable economic environment brought about by high inflation in the late 1970s and early 1980s made farm income even more uncertain. The massive debt due to capital investments could not be serviced adequately (Kislev, 1993). The development of non-agricultural manufacturing and service industries provided an alternative source of income, especially for the high-ability farmers. Out-migration from agriculture accelerated through two complementary channels: some farmers left the farm sector altogether, while others supplemented their income by engaging in non-agricultural activities (Kimhi, 2000; Sofer, 2001). The farm debt crisis that followed the 1985 economy-wide stabilization plan was a major accelerator for this process. Many farms became practically delinquent due to the high real interest rates and could no longer fulfill their role as a source of living. Many cooperatives collapsed, leaving their members without the safety net and support system that had served them for decades (Kislev, Lerman and Zusman, 1991; Schwartz, 1999). Farmers were increasingly shifting to alternative income-generating activities, while some of the more productive farms were able to acquire more farm resources and expand production. Today, in most rural communities only a handful of families are living off agriculture (Sofer and Applebaum, 2006; Kimhi, 2009).

Figure 1 shows the changes in the number of farm workers over the years. The number of Israeli workers, both self-employed and employees, declined sharply during the 1960s and the early 1970s.² This was mostly due to the fact that the immigrants of the early 1950s, who had no choice at the time but working in agriculture, gradually found jobs in other sectors of the fast-growing economy. From the mid-1970s to the mid-1980s the numbers of both self-employed and Israeli employees remained relatively stable, in part due to the stabilization of output prices during that period as a result of the shift to export crops. This was accompanied by the employment of roughly 10,000 Palestinian workers. The number of self-employed resumed its downward trend in the late 1980s, and the number of Palestinian workers also declined during the first Intifada and the first gulf war. The decline in the number of Palestinian workers was initially offset by an increase in the number of Israeli employees. The arrival of foreign workers in the mid-1990s halted the trend of self-employed exiting from agriculture, but it resumed in the mid-2000s, despite stabilization of output prices due to the global surge in commodity prices. At the same time, the number of Israeli employees (probably complements to the foreign workers) increased further, and in recent years the number of Palestinian employees started increasing. Altogether, the fraction of employees out of the agricultural labor force, which was roughly stable at just under 40% until 1990, increased almost monotonically since then and reached almost 80%. This is perhaps the best indicator of the structural change in agriculture that accompanied the arrival of the foreign workers.

² The number of self-employed includes unpaid family members and *Kibbutz* members. The number of unpaid family members was 14,500 in 1970 and went down to zero by 1998.

Despite the sharp reduction in the number of farmers in general, and full-time farmers in particular, over the years, agricultural output did not show any sign of contraction. Output growth did decelerate somewhat, from an annual rate of 3.5% between 1970 and 1991 to 2.8% between 1991 and 2012. The fact that output continued to grow is even more impressive given that agricultural growth in the earlier period was facilitated by an annual increase of 2.2% in farm capital stock, while this rate went down to 0.9% in the later period. One of the factors that allowed output to grow was the change in the crop mix. Figure 2 shows that the fraction of farmland used to grow fruits increased from 22% to 25% during the 1980s and remained stable since then. The fraction of farmland used to grow vegetables increased throughout the period, with modest increases up to the 1980s and an accelerated growth rate during the 1990s and especially in the last decade. Figure 3 shows that the changes in cropland allocation are reflected in the output mix. Specifically, while the output of all types of crops increased during the 1960s and 1970s, only output of vegetables and non-citrus fruits continues to grow since the 1980s. Since the production of both vegetables and fruits is labor intensive compared to field crops, the availability of cheap hired labor may have an important role in these changes. While the decline of citrus is mostly due to the relative decline in their price because of the competition in the European market, it still is consistent with the labor availability hypothesis, because the cultivation of citrus is less labor intensive than the cultivation of many other types of fruits.³

Much of the increase in agricultural output was exported (figure 4). This was particularly true for vegetables (except for the 1980s) and fruits other than citrus (except for the 1980s and 1990s). As mentioned above, both types of crops are perhaps most affected by the availability of foreign labor, and this may be the reason for the increase in exports. Figure 5 shows that the time profile of growth in agricultural exports was very similar to the time profile of the increased dependence on hired labor in agriculture. This does not imply causality, of course, but it does reflect the structural change that occurred in Israeli agriculture since foreign labor was allowed to enter the country.

Theoretical framework

Kislev (2003) offered a theoretical model to evaluate the impact of foreign labor on the agricultural sector. It is based on a constant-returns-to-scale Cobb-Douglas production function in which an intermediate agricultural product (value added) is produced using inputs of labor and capital, and a fixed proportions technology that transforms this intermediate product into a final agricultural product, using purchased inputs such as water, fertilizers and pesticides. The driving force in the model is the availability of hired labor for lower wages. This leads to an increase in the use of hired labor and an increase in capital investments on each farm, both leading to higher farm production and larger farms. In the long-run industry equilibrium, production, capital and hired labor use will be higher, but due to the inflow of foreign labor, local hired labor will be lower. The number of farms will be lower, except for a case in which the local demand for agricultural products is sufficiently

³ While citrus cultivation requires labor mostly for harvesting, cultivation of other fruits requires considerable labor input in trimming and pruning in addition to harvesting.

elastic, or when a sufficiently large fraction of output is exported. Prices of locally consumed agricultural products will be lower, and exports of exportable products will be higher. Provided that the alternative income of farm operators remains the same, their profits will not change in the long run. In the short run, however, profits may go down until the number of farms adjusts.

Is the theory supported by the data?

A simple confrontation of the theory with data can be made by comparing changes in the relevant observable quantities before and after the arrival of foreign workers. Table 1 reports average annual rates of change by decade. The increase in the number of foreign workers is evident in the 1970s (Palestinians), 1990s (Thais) and to a lower extent in the 2000s (both Thais and Palestinians). If foreign workers substitute for Israeli workers, their wage should have decreased as well as their number). In fact, during the 1970s the wage of Israeli workers in agriculture (normalized by the wage of workers in manufacturing) did not change, while their number declined. During the 1990s, the wage of hired Israelis declined but their number went up, while during the 2000s both the number of workers and their wage increased. At best, there is weak support for the fact that foreign labor substitutes for hired Israelis. Perhaps it was true in the 1970s, but in recent years the evidence is in the opposite direction. Perhaps treating the hired labor force in agriculture as heterogeneous would be more credible. If in fact there are both skilled and unskilled workers, with the former serving in managerial positions as well as operating machinery, and the latter doing manual tasks, foreign labor could be substitutes for the unskilled workers and complements to the skilled workers. It makes sense that substitutability was dominant in the early years and complementarity became dominant later, when farms became larger and more mechanized.

The number of self employed in agriculture, which serves as a proxy for the number of farms, has an overall downwards trend. The decline was very modest in the 1970s, when output prices went up. It went down more sharply in the 1980s, when output prices declined, and even more so in the 1990s, when output prices continued to decline and foreign labor increased sharply. The rate of decrease in the number of farms was still high in the 2000s despite the increase in output prices, perhaps due to the continued increase in the number of hired workers, both domestic and foreign, and the increase in farm size. Hence, there is some evidence that the reduction in the number of farms is related to the inflow of foreign workers. Farm size itself increased throughout the period of investigation, at a rate that is not surprisingly negatively correlated with the rate of decrease in the number of farms.

Farm capital stock increased in the 1960s and the 1970s for reasons that are perhaps not related to the availability of foreign labor. It declined in the 1990s despite the inflow of foreign workers, and resumed its increase in the 2000s. Overall, farm capital shows signs of substitutability with labor in some periods and complementarity with labor in other periods. The rate of growth of farm output was highest during the 1960s due to the heavy capital investments, and declined monotonically throughout the period without showing any

relation to the changes in the size and composition of the labor force. However, agricultural exports, which declined somewhat in the 1980s, increased more than 5% annually during the 1990s and the 2000s, despite a more modest increase in farm output as a whole, and this is consistent with the model's predictions. Note that the increase in exports in the 1990s occurred despite a decrease in the price of exports, both compared to the consumer price index and to the prices of agricultural products in the domestic market.

Discussion

The growth in Israeli exports of fresh produce in the last two decades and especially in the last decade is reasonably linked to the inflow of foreign workers. The workers from Thailand turned out to be much more than a source of cheap labor that competes with local low-skilled workers. They allowed farms to expand their marketing efforts overseas and specialize in crops that are demanded overseas. They also allowed farms to expand within-farm labor specialization, with farm operators and hired Israelis doing mostly managerial tasks and supervision, and Thais doing the manual tasks. The question is why all this did not happen when it was only Palestinians working in agriculture. The reason might be related to the reliability of the workers. Palestinians were not allowed to stay overnight, and their long commute did not allow their employers to use them flexibly. Also, Palestinians worked on a daily basis, relied on contractors to drive them to the farm, and farmers could never know how many workers will show up each day, especially on rainy days. Thais, on the contrary, reside on the farm, are always willing to work longer hours if needed, and perhaps more importantly, are not allowed to switch employers easily. They turned out to be very reliable and farmers had a much better certainty about how long it would take to finish a certain task and what the quality of the work will be. All this allowed farmers to adopt precision cultivation methods that helped them satisfy the strict requirements of overseas customers, enter overseas markets with larger quantities and offer a more diversified portfolio of produce. All this contributed to the export growth.

Although it was not possible to establish the association between the foreign workers and the increase in exports empirically, much of the evidence points in that direction. Exports of vegetables increased more than exports of fruits, perhaps because precision agriculture is more important for vegetables. A large portion of vegetables are grown in greenhouses, and they tend to have a shorter shelf life compared to most fruits. Within fruits, exports of citrus did not increase, perhaps because citrus does not depend as much on labor as other fruits, requiring mass labor input only for harvesting. A more disaggregated analysis of exported crops could possibly strengthen the case of the precision agriculture hypothesis.

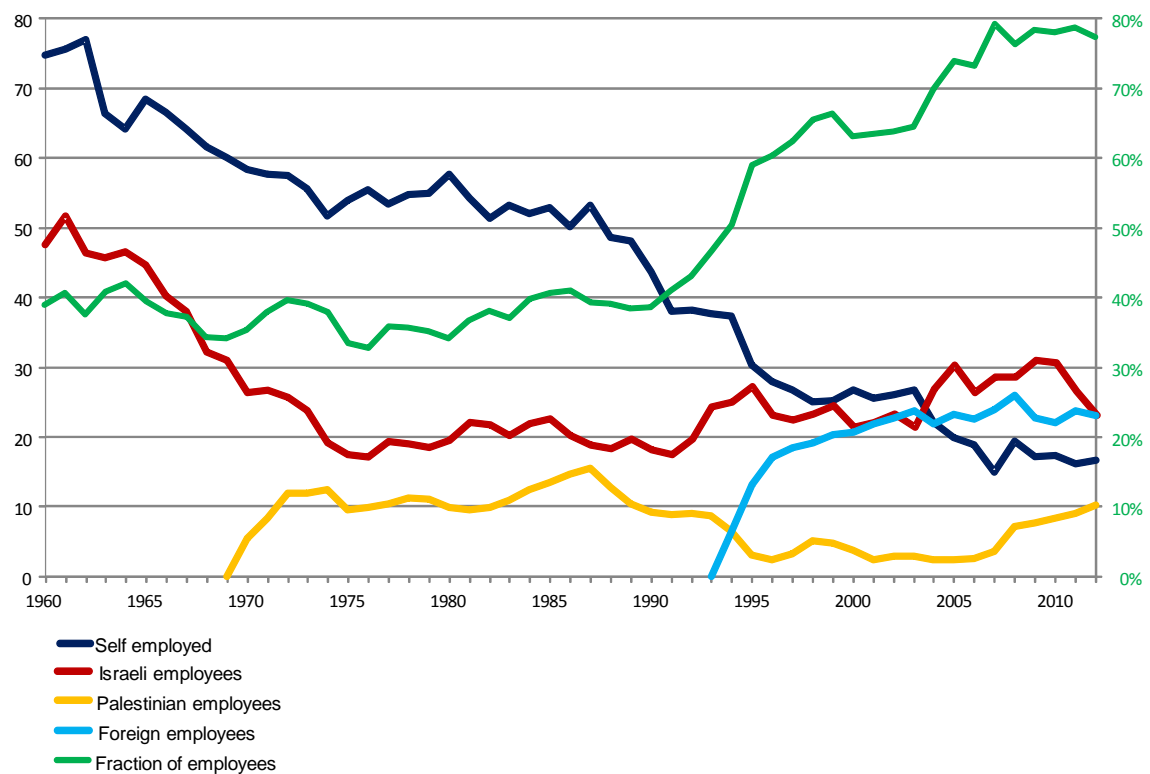
The analysis also pulls the rug under the argument that foreign workers in agriculture drive the local unskilled workers out of the labor market. First, higher labor specialization actually creates jobs for hired Israelis who are able to assume managerial and supervision positions. Second, Thais and Israelis are not perfect substitutes even in manual unskilled tasks, because of the willingness of the Thais to work long and irregular hours. Finally, all government attempts to subsidize Israeli farm workers have largely failed, although the jury is still out on the latest programs.

The bottom line is that using the services of Thai workers in agriculture is largely irreversible. Farms went through structural changes and adopted cultivation methods and crops that are specifically suitable for the availability of foreign workers, and if these workers will not be available many of the farms will simply go out of business. As opposed to most other industries in Israel, productivity in agriculture is comparable to that of other developed countries (Ben-David, 2013), and this is evidence for the competitiveness of Israeli agriculture. The success of agriculture in penetrating export markets should be imitated by other industries, and allowing foreign labor to come in legally for a specific period is a price that is worth paying.

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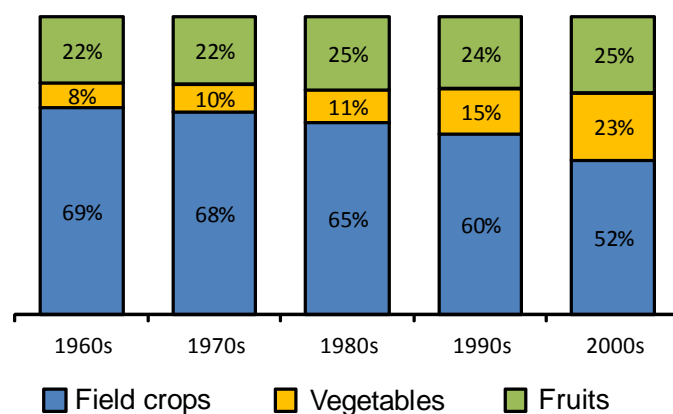
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Figure 1. Workers in agriculture by work status and nationality (thousands)



Source: Israeli Central Bureau of Statistics, Statistical Abstract of Israel (various years)

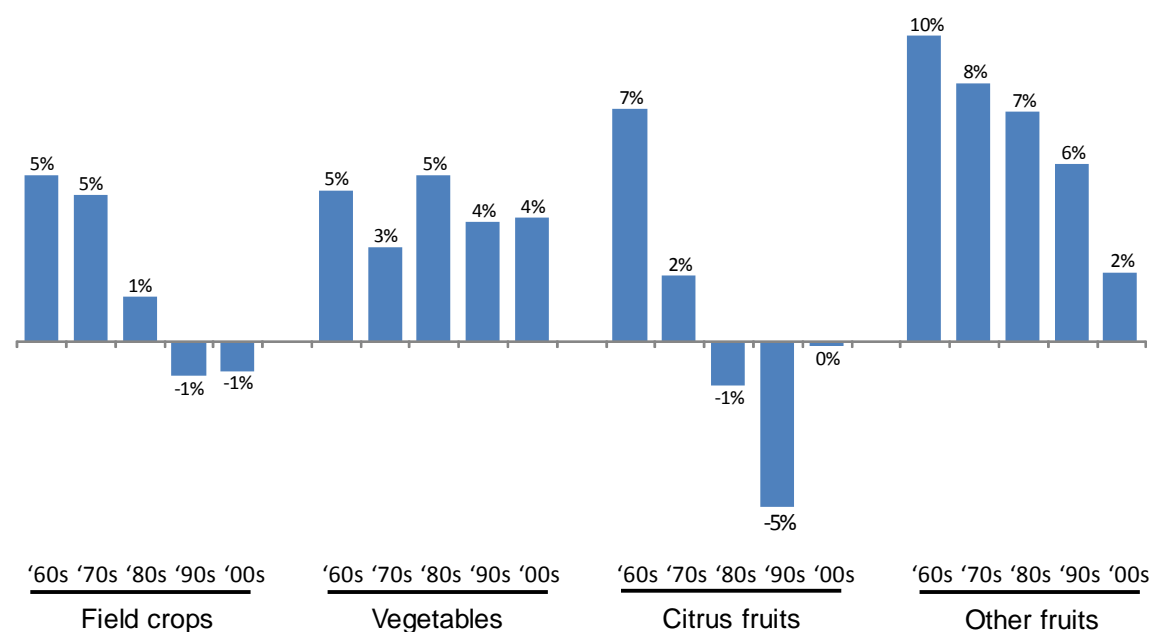
Figure 2. Cropland allocation by major crop categories



Source: Israeli Central Bureau of Statistics, Statistical Abstract of Israel (various years)

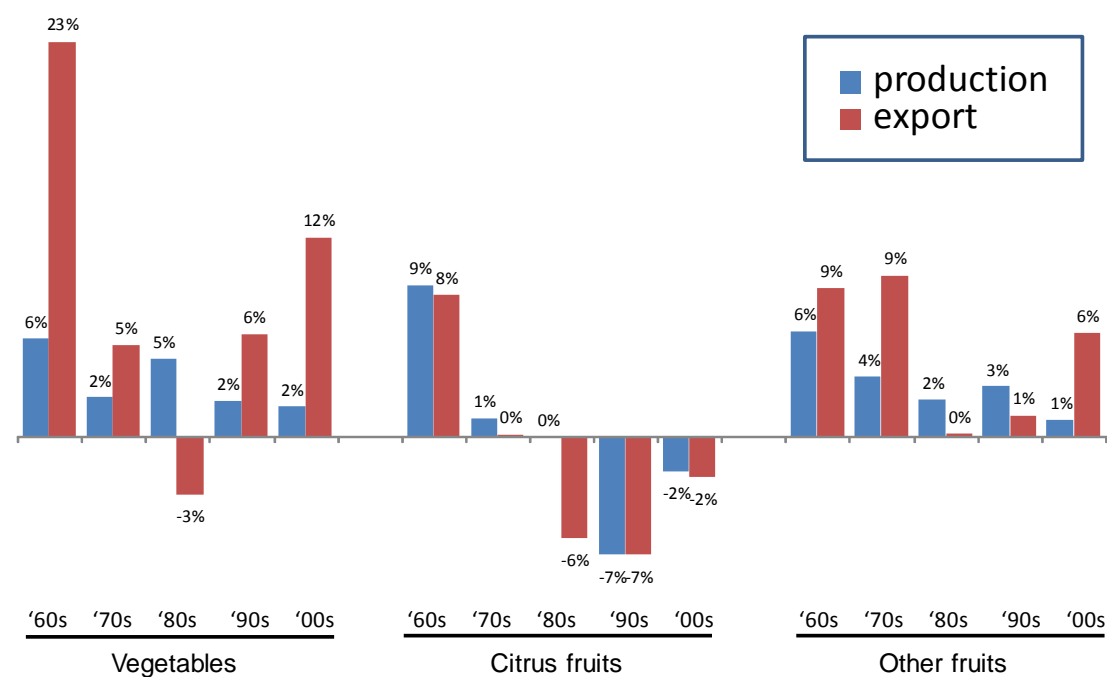
Note: Cropland allocated to flowers and nurseries is excluded because of the lack of recent data. In 1999, the last year for which data is available, the excluded category was 1.5% of cropland.

Figure 3. Average annual increase in quantity produced by major crop categories



Source: Israeli Central Bureau of Statistics, Statistical Abstract of Israel (various years)

Figure 4. Average annual increase in the value of production and export by major crop categories



Source: Israeli Central Bureau of Statistics, Statistical Abstract of Israel (various years)

Figure 5. Domestic and exports output value and the fraction of hired employees

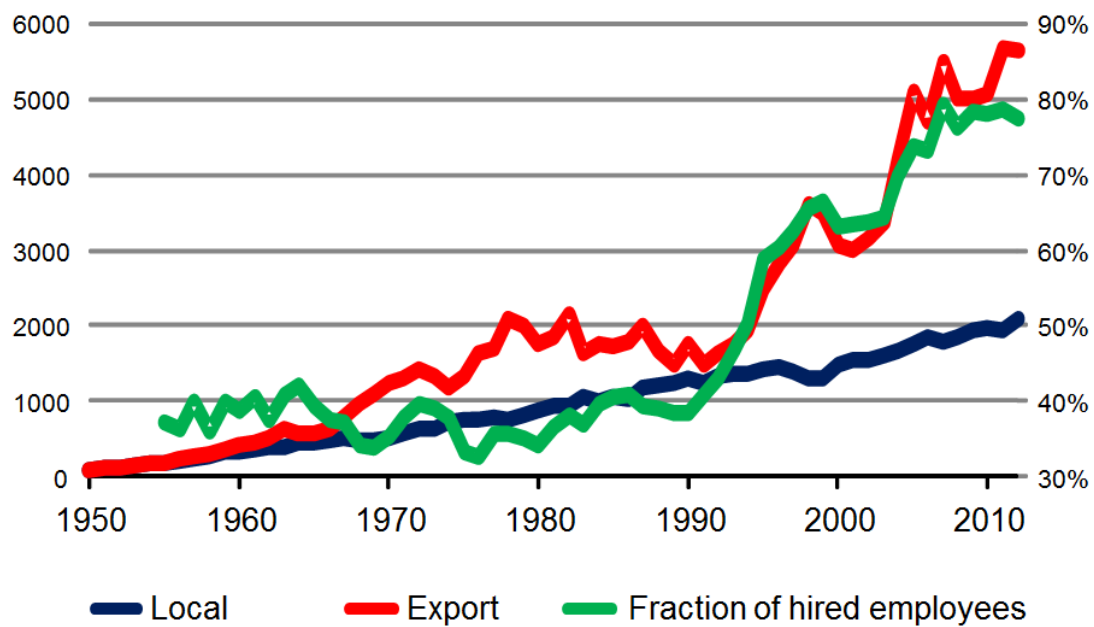


Table 1. Average annual changes in selected variables by decade

<u>Variable</u>	<u>1960s</u>	<u>1970s</u>	<u>1980s</u>	<u>1990s</u>	<u>2000s</u>
Foreign labor	---	6.1%	-0.7%	10.2%	2.2%
Hired Israeli wage	1.0%	0.0%	-0.9%	-1.2%	0.7%
Hired Israelis	-5.7%	-3.0%	-0.8%	1.7%	3.6%
Self employed	-2.5%	-0.1%	-2.7%	-4.8%	-4.3%
Real output price	-1.8%	0.6%	-4.2%	-4.2%	1.1%
Farm size	8.9%	6.7%	9.6%	11.3%	8.5%
Capital stock	4.4%	2.8%	0.6%	-1.1%	1.8%
Farm output	6.4%	4.8%	3.0%	2.5%	2.2%
Agricultural exports	11.1%	3.5%	-0.1%	5.8%	5.2%
Export price index	-1.1%	0.0%	-3.1%	-5.1%	4.3%
Domestic price index	-2.3%	0.9%	-4.8%	-3.9%	-0.4%